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PROCUREMENT SECTION
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White-Pine Weevil

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The white-pine weevil (*Pissodes strobi* (Peck)) is the most serious insect pest of eastern white pine. It is a native insect that occurs throughout the range of its host tree. The insect attacks trees in natural stands, plantations, and small ornamental plantings. It stunts and distorts young trees, greatly reducing the quality and quantity of the lumber produced. It destroys the natural symmetry of ornamental white pines.

Within its natural range, the weevil may attack a number of coniferous species other than white pine. Norway spruce and jack pine may be as severely infested as white pine. Pitch pine is frequently attacked, as are red pine, Scotch pine, and red spruce.

Evidence of Infestation

In spring the first evidence of weevil attack is the appearance of

resin droplets oozing from feeding punctures. These are most evident near the terminal bud cluster on the previous season's growth. Later in the season, because of feeding by the weevils, these buds will elongate less rapidly than the buds of the branches. If the feeding damage is severe, the buds may grow very little or not at all.

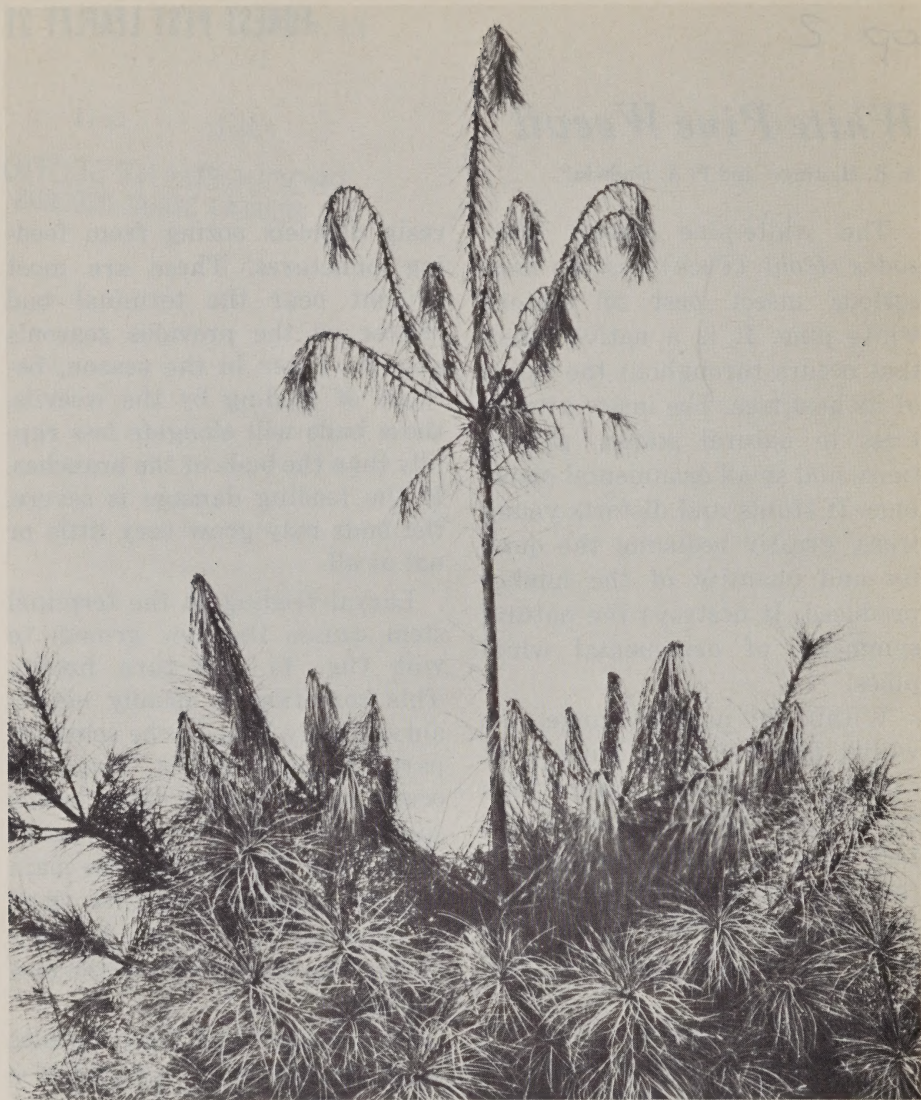
Larval feeding in the terminal stem causes the new growth to wilt (fig. 1) and turn brown. This condition is usually noticeable in early June in the southern part of the weevil's range. It occurs progressively later in the summer in the northern areas. Frequently the injury to the main stem extends below the first whorl of branches. When this happens all the affected top part of the tree will die.

By August the dead needles cause the top of an infested tree to be reddish brown. By this time the bark of the infested part is reddish brown, loose, very thin, and brittle. Small, circular holes about one-tenth of an inch in diameter are scattered over the surface. These are made by the new

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Figure 1.—The wilting top of this white pine is the most conspicuous early sign of attack by the white-pine weevil.

generation of adult weevils as they emerge from their pupal cells.

Damage

Both the adult and immature weevils seriously injure an infested tree. Heavy feeding by adults, in either the spring or

fall, partially girdles the terminal stem and greatly reduces its growth. This also happens when only a few eggs are laid and there are not enough larvae to completely girdle the stem. When there are enough larvae to completely girdle the stem, 2 years'



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Figure 2.—Deformed trunk is the result of killing of white pine terminal stem by the weevil. Note dead stub in center.

growth is always killed, and frequently 3 or 4 years' growth dies. In response to the death of the terminal shoot, one or more

branches of the uppermost live whorl turn upright and assume role of a stem. This results in a crooked or forked tree (fig. 2). The crooks and forks persist for many years on white pine, causing weevil-damaged stands to be easily distinguished from undamaged ones (figs. 3 and 4).

In addition to the direct damage caused by the weevil, further damage often results when red heartrot invades the tree through the weevil-killed stem.

Description and Life History

The eggs are about 1/25-inch long (fig. 5, A). They are laid singly or in clusters of two or three in small cavities chewed in the bark of the leader by the females in the spring. Larvae hatch in a week to 10 days and begin to feed down the terminal stem beneath the outer bark. In the following 5 or 6 weeks, the larvae develop through four larval instars. The larvae are legless grubs, about $\frac{3}{8}$



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Figure 3.—White pine stand free of weevil damage.



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Figure 4.—White pine stand damaged by the weevil.

inch long when full grown, with a distinct reddish-brown head (fig. 5, *B*). At the end of the feeding period, the larvae construct a pupal chamber in the wood or pith of the stem. The entrance to the chamber is filled with coarse wood chips. In the pupal chambers the larvae pupate and change into adults (fig. 5, *C*).

Adult weevils leave the infested stems from late July to late September and fly or crawl to the lateral branches to feed. The adults are brown beetles about $\frac{1}{4}$ inch long, with a long snout to which the antennae are attached (fig. 5, *D*). White and tan scales, arranged in the form of large and small spots, cover the body. The most conspicuous spots are toward the ends of the wing covers. Adults of the white-pine weevil may be confused with those of the northern pine weevil, *Pissodes approximatus* Hopkins, especially

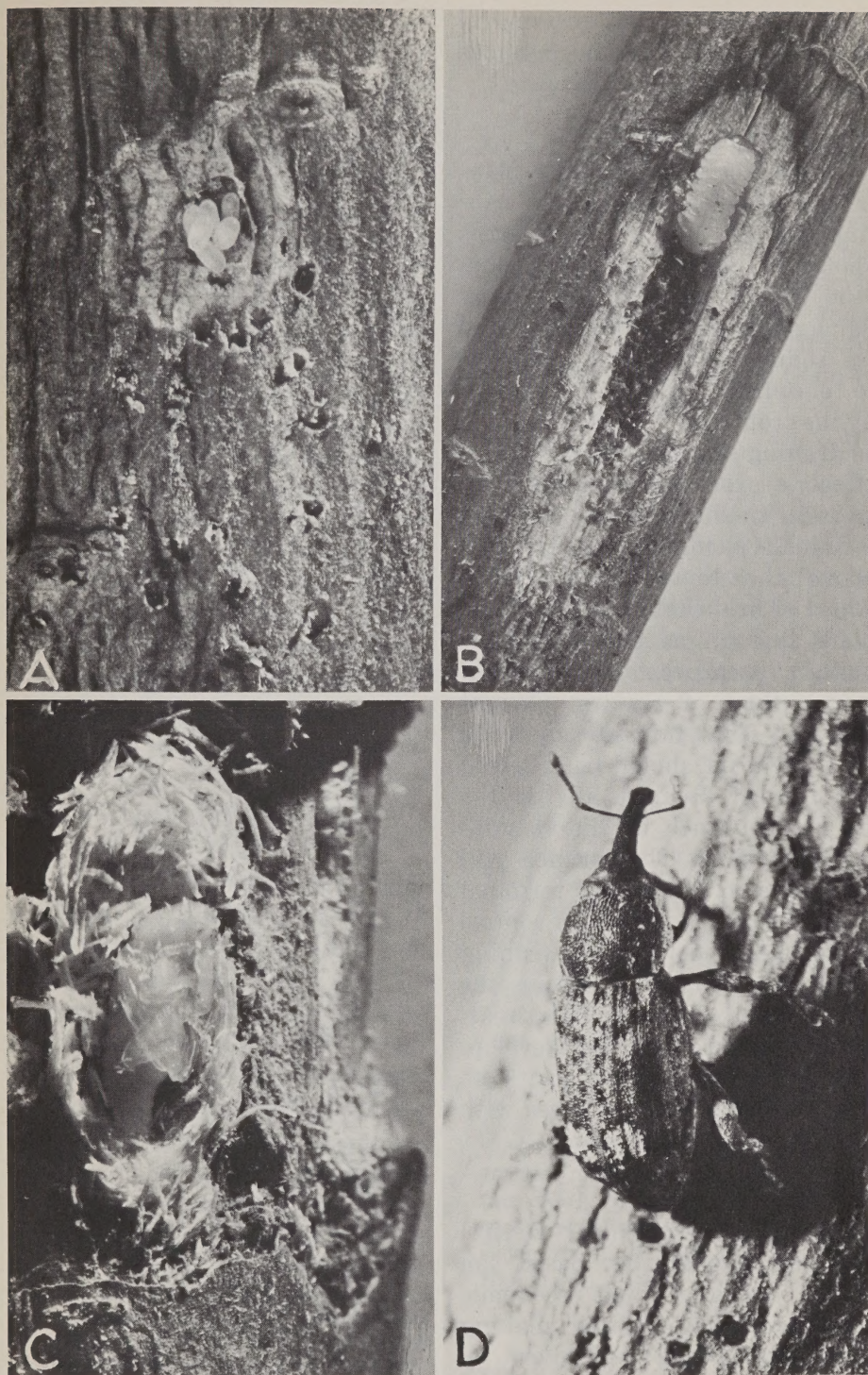
in the fall when both species are feeding on the branches. After feeding, the weevils begin hibernation in the litter beneath the pines on which they have fed. There is only one generation a year, and the weevils do not lay eggs until they leave hibernation the following spring.

Natural Control

Insect parasites and predators, birds, and insect-eating mammals at times kill large numbers of weevils. They have not been effective, however, in controlling large populations of weevils.

Prevention

The adult weevil tends to fly above the general canopy of a stand, thus, taller pines are more likely to be attacked. The incidence of weevil attack is reduced where there is a hardwood overstory. This overstory reduces pine



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Figure 5.—Life stages of the white-pine weevil: *A*, Eggs; *B*, mature larva; *C*, pupa; *D*, adult.

growth until cut. After removal of the overstory, the pine becomes susceptible to weevil attack.

Mechanical Control

In heavily damaged pure plantations or natural stands of sapling size, the least damaged trees should be selected to be the final crop trees. Competing heavily damaged trees should be removed by sound silvicultural practices to encourage maximum growth by the crop trees.

Pruning infested trees can be effective for ornamentals and trees in small plantings. Infested terminals should be cut off just above the topmost undamaged whorl of branches. This should be done as soon as the damage is noticed, to prevent the death of more than 2 years' height growth. The infested material that is cut off should be collected and burned. Remove all but the strongest branch of the remaining top whorl. This branch will then develop as the new terminal stem. To provide effective control of the weevil population, pruning must be completed before the adult weevils emerge. This treatment will prevent the development of "cabbage trees" with no definite leader stem or trees with two or three leader stems.

Chemical Control

The use of chemical control methods should be based on sound biological and economic evaluations. Guides for making these evaluations are given by Marty and Mott (see list of references at end). Generally a

young plantation should be inspected for evidence of damage when the trees are 2 to 3 feet tall. Normally, treatment programs should be considered when 2 to 5 percent of the trees are weeviled in one season. When 10 percent of the trees are weeviled, a second treatment program should be planned. Usually a second treatment is not required until 3 to 6 years after the first treatment. Following the second treatment, 6 to 12 years of protection should result. At the end of this period, there should be enough non-weeviled trees with a 16-foot butt log to form a well-stocked stand.

The following formulations of Lindane, 20-percent emulsifiable concentrate (1½ pounds of active ingredient per gallon), are registered by the U. S. Department of Agriculture for weevil control.

Low-pressure sprayer applications.—For fall and winter treatments (at temperatures above 40° F) drench-spray the entire length of the terminal stem. Use 6.4 ounces of lindane (2 pints) plus 8 ounces of a sticker, Pinolene³ 1902, and sufficient water to make 1 gallon of spray.

For spring treatment, drench the terminal stem. Use 3.2 ounces of lindane (1 pint) plus 4 ounces of Pinolene 1902 and sufficient water to make 1 gallon of spray.

³ This information is given for the convenience of the reader and does not constitute an official endorsement or approval by the U.S. Department of Agriculture of any product to the exclusion of others which may be suitable.

Mistblower applications.—For treatments in fall, winter, or spring, use 16 ounces of lindane plus 16 ounces of Pinolene 1902 and sufficient water to make 2 gallons of spray. Apply mixture at the rate of 2 gallons per acre. The application should be directed to the upper one-third of the crown.

Pesticide Precautions

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key—out of the reach of children and animals—and away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or when they may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment if specified on the container.

If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicides from equipment, do not use the same equipment for insecticides or fungicides that you use for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary land-fill dump, or crush and bury them in a level, isolated place.

WARNING: Recommendations for use of pesticides are reviewed regularly. The registrations on all suggested uses of pesticides in this publication were in effect at press time. Check with your county agricultural agent, State agricultural experiment station, or local forester to determine if these recommendations are still current.

References

- THE WHITE-PINE WEEVIL (*Pissodes strobi* (PECK))—ITS BIOLOGY AND CONTROL. HARVEY J. MACALONEY, N. Y. State Coll. Forest. Bull. Vol. 3, No. 1 (Tech. Pub. 28), 87 p. illus. 1930.
- EVALUATING AND SCHEDULING WHITE-PINE WEEVIL CONTROL IN THE NORTHEAST. ROBERT MARTY AND D. GORDON MOTT. U.S. Forest Serv., Northeast. Forest Exp. Sta. Res. Pap. NE-19, 56 p. illus. 1964.
- SUGGESTED GUIDE FOR THE USE OF INSECTICIDES TO CONTROL INSECTS AFFECTING CROPS, LIVESTOCK, HOUSEHOLDS, STORED PRODUCTS, FORESTS, AND FOREST PRODUCTS. U. S. Dept. of Agr., Agr. Handb. 331. (In process of revision.)



Use Pesticides Safely
FOLLOW THE LABEL

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